

NC Sport Fish Restoration Final Report

State: North Carolina

Grant Number: F-75, Segments 6-10

Grant Title: Fisheries Information Management and Support System (FIMSS) Operation and Maintenance

Grant Award Period: June 1, 2006 – June 30, 2011

Project Costs:

	<u>Budgeted</u>	<u>Expenditures</u>
Federal	\$1,076,925	\$ 890,427.75
State	\$ 358,975	\$ 296,809.25
TOTAL	\$1,435,900	\$1,187,237.00

Grant Objective: Maintenance, operation and enhancement of the Fisheries Information Management and Support System (FIMSS) that provides access to biological, life history, monitoring, recreational harvest, habitat use and classification data collected by the NC Division of Marine Fisheries (NCDMF).

JOB 1: Maintenance and enhancement of the NCDMF Biological Database

Objectives: Enter new and corrected data into the NCDMF Biological Database on an average of 10,000 records per week for 63 active programs, test and evaluate new customized data entry programs, and maintain high database quality through quality control procedures.

Activities Proposed:

Information Technology (IT) staff will process data into the Biological Database (BDB) from NCDMF studies funded through Sport Fish Restoration grants. DENR ITS staff will process data from fishery independent surveys including basic biological data such as catch per unit of effort, length, weight, age structure, and sex for a number of important recreational finfishes in North Carolina. DENR ITS staff will also process fishery dependent sampling data including age structure, harvest information, and catch size information and recreational harvest estimates and associated biological data of the Marine Recreational Fishery Statistics Survey.

Transactions to the BDB average around 480,000 per year, and are associated with an average of 63 active NCDMF research programs. Entry to the database takes on two facets: direct keyboard data input and conversion of data from other software. Direct entry into the database will be processed on an average of 10,000 records per week. Conversion of data from other software occurs only on an infrequent basis but it is required approximately twice a year. Specialized programs may be written to handle these data conversions.

For each of the two types of entries, quality of the data is paramount. Quality control methods and procedures will be used to ensure data submitted by users are clear, correct and ready for entry. All tasks that place the data in the database will be tracked and documented. Source data and reports will be maintained for certain timeframes established by the Biological Users Group (BUG) and disposed of in a sensitive manner.

BUG has conducted a series of meetings to identify deficiencies and determine actions to mitigate risks or improve the overall operation of Biological Database processes and procedures. A strategy will be developed to document system processes and procedures followed by the DENR ITS Biological Database Programmer in the maintenance and support of the Biological Database. A strategy will also be developed for a member of the DENR ITS programming staff to function as a backup in the absence of the primary Biological Database programmer.

Project Summary:

FIMSS maintained biological research data from the many studies funded by the Sport Fish Restoration grants, listed below:

- Pamlico Sound Independent Gill Net Study (F-70) from 2006 to 2011.
- Striped Bass Monitoring (F-56) from 2006 to 2011.
- Investigation of Perch and Catfish in Albemarle Sound and its Tributaries (F-80) from 2006 to 2011.
- Survey of Population Parameters of Marine Recreational Fishes in North Carolina, Pamlico Sound Survey and Red Drum Seine Survey (F-42) from 2006 to 2011.
- Artificial Reef Evaluation (F-41) from 2006 to 2009.
- Assessment and development of North Carolina's estuarine reef and oyster sanctuary systems (F-92) – from 2009 to 2011.
- Marine Recreational Fishery Statistics Survey (F-31) from 2006 to 2011.
- North Carolina Cooperative Striped Bass Creel Survey (F-79) from 2006 to 2009.

Tables 1, 2 and 3 summarize the activities that took place in processing data into the Master Files of the NCDMF Biological Database.

Table 1. Records keyed for new and corrected data by Segment.

F-75 Segment	FY	Avg / Week	Total Records Keyed
Segment 6	2006-07	11,814	614,371
Segment 7	2007-08	10,037	521,929
Segment 8	2008-09	13,423	698,040
Segment 9	2009-10	12,921	671,898
Segment 10	2010-11	15,466	804,232
TOTAL Segments 6-10		12,732	3,310,470

Table 2. Biological Collections and Update Files for new and corrected data by Segment.

F-75 Segment	FY	Biological Collections	Update Files Processed
Segment 6	2006-07	25,902	1,255
Segment 7	2007-08	22,166	1,270
Segment 8	2008-09	22,993	1,415
Segment 9	2009-10	27,977	1,527
Segment 10	2010-11	22,519	1,293
TOTAL Segments 6-10		121,557	6,760

Table 3. Biological Program Summary by Segment.

F-75 Segment	FY	Active Biological Programs*	New Biological Programs	Total Biological Programs
Segment 6	2006-07	37	4	127
Segment 7	2007-08	38	2	129
Segment 8	2008-09	45	4	133
Segment 9	2009-10	47	2	135
Segment 10	2010-11	47	1	136

**Numbers reported are active biological programs that supplied data during the performance period.*

During segments 9 and 10, a pilot program for a small biological program (611) successfully evaluated the use of field tablet PCs to capture data in the field electronically. Over 10,000 records were collected each year representing 2% in segment 9 and 3% in segment 10 of the total contribution of new records added to the Biological Database.

Database quality remains a high priority. In addition to quality control measures routinely employed in normal processing, existing errors detected by software continue to be investigated by Data Management. A data correction application for specific biological programs was developed and installed on biologists and technicians PCs. Using this application, biologists and technicians were able to receive electronic copies of their data collections, modify the data, and submit corrections electronically without the use of paper forms. To date, the volume of data processed in this manner is small, but there is interest to improve and expand the use of this application. Emphasis was placed on correcting data errors in years 2000 and later; however older known errors were investigated as time allowed. In Segment 6, the percentage of collections containing known errors was reported at 0.25% for years 2000 – 2007 and 2.52% for years 1993 – 1999. During the 5-year grant period, the percentage of collections containing known errors was significantly reduced to below 0.03% for years 2000 – 2011 and below 1.25% for years 1993 – 1999.

Data extractions from the FIMSS database contributed data to the following sources:

- Ad hoc requests from State, Federal, academic, and public sources
- Biological data transmissions on a scheduled basis in partnership with outside groups
 - Southeast Area Monitoring and Assessment Program (SEAMAP)
 - Trip Interview Program (TIP) - National Marine Fisheries Service (NMFS)

A member of the DENR ITS programming staff has begun the process of documenting specific technical operations of the Biological Database workflow process. Documentation has been generated for some of the technical system processes and procedures used by the DENR ITS Biological Database Programmer in the maintenance and support of the Biological Database.

The documents listed below were generated during Segment 10:

- Biological Database Data Corrections
- Biological Database Data Utilities
- Biological Database Servers Management
- 1998_1999 Biological Database Collected Technical Bulletins
- 2000 Biological Database Collected Technical Bulletins
- 2001_2003 Biological Database Collected Technical Bulletins
- 2004_2005 Biological Database Collected Technical Bulletins
- 2008_2009 Biological Database Collected Technical Bulletins
- Biological Data Coding Training 20090810
- Biological Database BioTracks and Reactivation
- Biological Database Updating Coding Manual

These documents will continue to be updated and expanded as additional technical documentation is added and training takes place.

JOB 2: Maintenance and enhancement of the NCDMF Geospatial Database

Objective: Add data to existing GIS datasets, maintain quality control of NCDMF geospatial data, migrate GIS data and programs to ArcGIS Server, and develop test project for web-based geospatial data viewer.

Activities Proposed:

The current GIS application of the BioGIS Link using ArcView software from ESRI will be maintained for NCDMF staff use. GIS data sets will be maintained, updated, and added to as identified by NCDMF program managers. An Enterprise GIS migration project will move the applications for BioGIS Link currently in ArcView to a web-based application on ArcGIS Server. The NCDMF GIS datasets and coverage files will be made more accessible by using ArcGIS Server software to create a geodatabase accessible over the internet (SDE technology), and distributing the data by using either a web-based application or the currently supported GIS desktop software. Creation and testing of these ArcGIS Server applications will allow users web access to the BioGIS Link application, which eliminates the need to constantly update multiple copies of the data stored on local servers. Also, additional tools will be developed with the inclusion of new biological programs, the study of fisheries data coupled with spatial analysis, as well as the maintenance and updates of current biological datasets as needed. To achieve this migration, the GIS staff must acquire skills using ArcGIS Server for distribution of data using ArcSDE and SQL databases, and gaining familiarity with object-oriented programming languages (.NET, Javascript, C#, etc.).

One position will support two fisheries habitat mapping programs - the Submerged Aquatic Vegetation Mapping Program which maps seagrass beds, and the Shellfish Mapping program which maps bottom strata. Responsibilities for maintaining these programs include GIS program support for GIS data set entry, data set editing, data set verification, inclusion of edits into master GIS data for each program. The two GIS data sets will be updated continuously through the grant year. Habitat information from these data sets will be used for analyses for GIS projects and programs for grant reports.

BUG has conducted a series of meetings to identify deficiencies and determine actions to mitigate risks or improve the overall operation of Biological Database processes and procedures. Coordination between the Biological Database and GIS programs will be improved in order to improve the use of GIS with the Biological Database data. This involves introducing better oversight and checkpoints to review and authorize changes in geospatial data contained in the Biological Database.

Project Summary:

SEG 6: Four new programs were added to the database. The GIS Technology Support Analyst position was advertised to fill the position vacated by the previous analyst for another GIS position internally. The previous analyst was available for knowledge transfer when the position was filled.

SEG 7: The GIS Technology Support Analyst position was filled and a transfer of GIS duties occurred in August '07. Training was provided by the previous GIS analyst in the areas of database framework, Biological Database extension in ArcView 3.3, and procedures to update GIS records to the shared drive and remote servers. Research was performed to identify options for upgrading the BioGIS extension into the current ArcGIS 9.x software. This required some form of translation to the source code or framework into an object-oriented programming language such as VBA, VB.NET, Java, and etc. or a combination of languages. There was also discussion of moving the GIS staff to a server-based orientation.

SEG 8: Considerable research was performed which resulted in a recommendation to upgrade the BioGIS Link extension to an ArcGIS 9.x compatible platform. NCDMF acquired ArcGIS Server 9.3 software in March 2009. Extensive work was done in conjunction with DENR ITS and GIS staff in Morehead City and Raleigh to install and configure a working test server in the following months.

ArcGIS 9.x software was installed or updated on six GIS developer workstations and three workstations in the business unit in the Morehead City office. Training was provided to staff in the business unit to increase their proficiency in the use of ArcGIS 9.x.

SEG 9: Tasks were accomplished to accommodate a new program, Juvenile Grouper Sampling, Program 143. It consists of 5 collection stations.

In the series of meetings conducted by BUG, possible improvements were identified to help biologists with the use of GIS paired with the Biological Database data. This involves introducing better oversight and checkpoints to review and authorize changes in geospatial data contained in the Biological Database in order to mitigate risks, or improve the overall operation of Biological Database processes and procedures.

Most of the efforts to expand functionality of the Biological Database within this year were directed towards distributing data via ArcGIS server. The DENR ITS staff at NCDMF dedicated a working test server in the NCDMF Central District Office. Considerable effort was required to configure the equipment, create test datasets and mapping applications, and set up the secure network which allowed access by remote NCDMF offices. This step was helpful in understanding the processes and configuration needed for distributing maps, data, and applications to remote offices to eliminate the existing strategy of maintaining a copy of the data hosted at their office. It also served as an early model for ways of maintaining a secure, complete, and accurate copy of records using ArcGIS server and SDE technology.

It was identified that migration of GIS data to a server or SDE technology will require a skill set that is new and unfamiliar to the staff at NCDMF. Courses were identified to aid in acquiring these skills, but funds were not available to complete the training. The GIS position on the F-75 grant responsible for habitat mapping of Submerged Aquatic Vegetation (SAV) and Shellfish Mapping Program (SMP) was not filled in this grant year. Habitat mapping was supported by state-funded NCDMF staff during the grant year.

SEG 10: Extensive preparation and effort was performed to replace the GIS file servers at the remote offices, and to create a more efficient and regimented update schedule. DENR ITS Operations assisted in this project to identify GIS requirements for servers, load the GIS Library on the servers, confirm users have access, confirm the GIS software is functional, run a performance status, and provide installation reports for the five GIS data servers at Elizabeth City, Washington, Manteo, Wilmington and Washington offices. An inventory survey of software loaded on GIS user's machines was completed.

A new system was implemented to update the remote servers using Beyond Compare software. This system is set up to run a check for updates to the main server, and replicates the updates on all of the remote servers on a pre-set schedule. The software is set to automatically run the check on a monthly basis. More frequent updates were performed manually as requested.

The Enterprise GIS project has been revised to comply with the NC DENR Enterprise GIS approach. A significant amount of effort in meetings and discussions was completed to identify project goals to move forward in the implementation of the Enterprise GIS system. Training needs were identified to accomplish the GIS application customization. Adjustments were made to the existing test server beta applications, and research into performance enhancing data management practices was accomplished.

The DENR ITS GIS team received an unused Windows server from NCDMF Marine Patrol that is more suited to handling the data load incurred by distributing ArcGIS Server applications. Preparations are underway to configure the server for installation of all the software components required to successfully distribute web-based mapping applications.

After much research into deploying maps using ArcGIS server as a data distributor, it was recommended that using Adobe FLEX as an application front end would be beneficial for the BioGIS link project. Flex was identified as being one of the more user-friendly scripting languages that work with data on SQL servers. A self-paced online course offered by GeoSpatial Training Inc. was identified and purchased in March 2011, and the course is currently underway.

Table 4. Biological Database Station Additions and Location Adjustments

Program	F-75 Seg. 6	F-75 Seg. 7	F-75 Seg. 8	F-75 Seg. 9	F-75 Seg. 10
100: Juvenile Anadromous Survey	None	Station Additions Made, Station Locations Adjusted	None	None	None
101: Cape Fear and New River Juvenile Anadromous Survey	None	None	None	None	58 Station Additions
115: Albemarle Non-Anadromous Spawning Survey	New Dataset Created	Station Additions Made, Station Locations Adjusted	62 Station additions, 2 Coordinate Adjustments	116 Station Additions	Station Locations Adjusted
143: Juvenile Grouper Survey	None	None	None	New Dataset Created with 5 Stations	None
120: North Carolina Estuarine Trawl Survey	Station Locations Adjusted	Station Additions Made, Station Locations Adjusted	9 Station Additions, 10 Coordinate Adjustments	None	None
150-160: Adult Anadromous Spawning- Anadromous Egg and Larval Survey	Station Additions Made	Station Locations Adjusted	409 Historical and 187 New Station Additions	415 Historical and 200 New Station Additions	None

JOB 3: Biological and Geographical Database Technical Assistance

Objective: Conduct training sessions on use of the biological database and GIS applications, and provide technical assistance to staff through geographic data analyses and map creation.

Activities Proposed:

NC DMF will adjust its licensing setup from single-use licenses for each user to working off of a centralized license server. The DENR ITS will upgrade all current ArcGIS 9.x users to the most current 9.3.1 version, and redirect the licenses to the server. Training sessions will be performed at all offices during the installation to instruct staff on new functionality or to refresh the user with both the biological and geographical databases. GIS staff will provide training to NCDMF staff as needed on use of the ArcGIS 9.3.1 software to access data, perform conversions and edits, general cartography and map layout design, GIS data library structure, and working with the current BioGIS Link extension in ArcView 3.3. Beta versions of internet mapping applications will also be presented to encourage testing. These training sessions will be coordinated with the NCDMF District Managers to ensure that they occur when the most biologists are available.

SAS is one of the most important tools that the biologists use in analyzing the data stored in the biological database. Several approaches will be used to assist biologists in the use of SAS:

- 1) Utility programs, written in SAS to assist biologists in processing data, will be generated by the Biological Database Programmer.
- 2) Internal classes and training materials will be created to assist the biologists in the use of these utility tools.
- 3) Users will be sent to external classes.

Users will be contacted periodically to ensure the understanding of the tools and to determine if problems are occurring. As problems are identified, they will be centralized in a log file to ensure accountability on problem resolution. Concurrently, map server applications can be created to address specific GIS needs while avoiding accessing the costly desktop software.

BUG has conducted a series of meetings to identify deficiencies and determine actions to mitigate risks or improve the overall operation of Biological Database processes and procedures.

Two surveys will be conducted of Biological staff:

- 1) A survey will be conducted to identify software tools in use and future needs to better manage costs and distribution of software for analyzing biological data.
- 2) A survey will identify and evaluate the extent of specific performance issues encountered to access Biological data from file, web, and application servers. The results of this survey will identify areas where improvements should be made for most efficiently delivering Biological Data from the Master Files and other data sources to the analysts' desktops for staff in all offices.

GIS staff will also assist NC DMF staff with using the databases and applications, data analysis and map-making upon request. GIS staff may also provide assistance and non-sensitive data to outside users upon request.

Project Summary:

SEG 6: GIS - Group training for biological analysts was performed in the following areas:

- BioGIS link
- GIS server folder structure
- NCDMF State Plane GPS extension
- Geographic coordinate data and map projections
- Map making for presentation and distribution

Technical support requests were handled at an average rate of six per month. Staff worked with the Biological Review Team (BRT) to define responsibilities and tasks for Data Management, record changes in biological program documentation, and accommodate electronic tag requirements within the biological database.

SEG 7: GIS - Group training for biological analysts was performed in the following areas:

- BioGIS link
- GIS server folder structure
- Geographic coordinate data and map projections
- Map making for presentation and distribution

A group of NCDMF staff from the Pamlico district were interested in obtaining and learning ArcGIS 9.x software. This software was installed on their machines, followed by a three hour demo/training session to go over tools and processes useful in creating customized maps.

SEG 8: The South Atlantic Marine Fisheries Council (SAFMC) requested biological data for use in their online mapping server. GIS staff attended a November 2008 meeting in St. Petersburg to discuss strategies on how to provide the data to SAFMC. At the time of the meeting, NCDMF had just begun research into the use of a GIS server, so a demonstration of current capabilities was given to SAFMC, who then offered suggestions on how to make the data accessible to them, as well as others, through a GIS server.

The biological supervisor of the Washington Regional Office collaborated with the South Carolina Department of Natural Resource (SC DNR) to contribute NC biological data from Programs 195 (Pamlico Sound Survey) and 365 (Red Drum Longline Survey) to the Southeast Area Monitoring and Assessment Program (SEAMAP) database. A data conversion process had to be developed to conform to the design of the SEAMAP database. A biologist was hired in Washington to coordinate this task. The GIS Technology Support Analyst and biological programmer (Business and Technology Application Technician), both funded through the F-75 grant, participated in multiple phone conferences, email exchanges, and face-to-face meetings with NCDMF biological analysts on designing a strategy to extract and translate the data in an efficient manner.

There were 125 requests for assistance with database problems, primarily from analysts. The majority of the tasks involved selecting and formatting data for analysis, but some needed analytic help as well. Selecting and packaging data for delivery outside of NCDMF was also among the tasks. The effort to improve the database query and extraction tools continued.

SEG 9: During the performance period, DENR ITS implemented DOTS, the DENR Online Ticketing System, to track IT Helpdesk requests. GIS assistance was requested by biologists through this service, including the creation of maps and additions or adjustments to program stations datasets. The DOTS system also enabled biologists to track progress made on their individual requests.

There were 67 requests for assistance with database solutions, primarily from analysts. The majority of the tasks involved selecting and formatting data for analysis, but some needed analytic help as well. The requests involved FTP training including mainframe job submission and retrieval, mainframe output conversion, mainframe printing, SAS interfacing to desktop applications, program specific data retrieval, and web server query plus retrieval. Selecting and packaging data for delivery outside of DMF was also among the tasks. Improvement in the database query and extraction tools continued.

ArcGIS 9.3.1 was rolled out to the division during this year. The updated Electronic License Agreement between ESRI and NCDMF changed the policy on how software is distributed and licensed. As a result, GIS users are now directed to a license server located in Raleigh. This move will reduce the overhead of licenses owned by the division, reducing overall cost. Software was installed or updated on approximately 30 machines in all regional offices. Formalized training sessions occurred as requested by an individual or regional office or as a voluntary supplement to scheduled maintenance. Combining scheduled maintenance with training reduced travel costs involved with transporting GIS staff to regional offices, and to avoid time loss for other staff. Of the 24 GIS users in the Division, ten were directly assisted through training or technical support within the past year.

Research Planning Inc. was directed by NOAA to request biological database information for their Environmental Sensitivity Index data by using the Arcview 3.x BioGIS link. Significant effort took place to extract the data and compile it into a format that was usable for their needs. Five programs (100, 115, 120, 135, and 195) and more than 15 species were queried statewide for a presence/absence estimate completed by Research Planning using the data supplied by NCDMF.

SEG 10: During the scheduled installations of remote servers and software updates, staff members at remote offices were given the opportunity to sit in on a demonstration of capabilities of ArcGIS 9.3.1, with an open Q&A session afterwards. This meeting was performed at the Wilmington, Elizabeth City, and the Morehead City Main Office for a total of 15 staff members.

There was continued correspondence and tracking of ESRI datasets with the biological supervisor in Washington, and an analyst of Research Planning Inc. through email and two meetings. A result was a request to reformat the data supplied in the previous year to fit a new waterbody code system. The re-formatted data was submitted to Research Planning in November 2010.

A Mapping Advisory Team (MAT) was created to identify, prioritize, and track progress on GIS projects that NCDMF needs DENR ITS GIS to work on. Each project or capability of the GIS department was listed so that MAT members could become familiar with them, and give directions to how they can better serve the NCDMF staff. Meetings are scheduled on a bi-monthly basis to ensure that staff can regularly see enhancements in projects and be up to date with new technology.

Table 5. Customized Maps Made for Biological Programs by Segment

Program	F-75 Seg. 6	F-75 Seg. 7	F-75 Seg. 8	F-75 Seg. 9	F-75 Seg. 10
100: Juvenile Anadromous Survey	None	Trawl and Seine Map	None	Program Reference Map	Program Reference Map
115: Albemarle Non-Anadromous Spawning Survey	None	None	None	None	Map for Dam Removal Locations
120: North Carolina Estuarine Trawl Survey	Program Reference Map	Bottom Comp Map	None	Program Reference Map	Wilmington Area Active Stations
135: Striped Bass Independent Gill Net Survey	None	135 Grid Map	None	None	10ft Contour Grid Area Estimation
141: Deployment Density Study (F81)/Fish Count Survey	None	None	Artificial Reef Zones and Estuarine Reef Area Map	None	None

150-160: Adult Anadromous Spawning-Anadromous Egg and Larval Survey	None	Program Reference Map	None	None	None
190: Pamlico Sound Survey	None	None	None	None	Cownose Population Maps
510: Juvenile Shrimp Sampling	None	Program Reference Map	None	None	None
915: Pamlico-Neuse Watershed Gill Net Survey	None	None	Program Reference Map	None	None

To assist DMF biologists with the use of SAS, the following approaches were employed:

- 1) Utility programs were developed, including:
 - SAS subset macro modified for Habitat Data
 - Mainframe SAS dataset download
 - SAS subset macro modified for electronic tags
 - Biological database data tracking
 - Mainframe PDF output
 - Producing catch per unit effort (cpue) summaries on the NCDMF Biological Web server
 - Alternate biological database correction method
 - Combining SAS datasets
 - Open database connections (ODBC) for SAS and other applications
 - SAS subset macro additions
 - Getrecid process to help generate BDBCcorr (data correction) input files
 - Biological database lookup tools Tagshow and I9nshow
- 2) Documentation was created for each utility listed above and supplied in text or PDF format. Biologists were provided individual instruction as requested.
- 3) Staff were provided access to external classes:
 - a. Attendance to classes at SAS Institute in Cary, NC. Arrangements made by supervisors of biologists funded outside of this grant.
 - b. During Segment 10, internet-based training was made available to biologists via the SAS Enterprise License Agreement between SAS Institute and the State of NC. A total of 16 biologists registered for the following internet-based training classes:
 - Introduction to Statistical Concepts: Means, Standard Deviations, Confidence Intervals and Hypotheses Testing
 - SAS Programming 1: Essentials
 - SAS Programming 2: Data Manipulation Techniques
 - SAS Programming 3: Advanced Techniques and Efficiencies
 - SAS SQL 1: Essentials
 - SAS Macro Language 1: Essentials

JOB 4: Data Management

Objective: Update the Data Management Operations Manual, the NCDMF Biological Database Coding Manual, and GIS metadata as necessary to ensure standardization of data collected through biological programs.

Activities Proposed:

Documentation for a biological program defines the objectives of the program and the procedures that will be used to complete those objectives. It is the responsibility of the data management department to assure that the protocols stated in the documentation meet all system requirements. Data management must also make certain the document follows the same uniform standards set for all biological program documentation.

Data management defines guidelines for composing new biological program documentation. Prior to composing new documentation, the biologist reviews the instructions on program documentation contained in the Biological Database Coding Manual. This document contains all the elements that should be contained within new documentation. In addition to the standardized procedures covered in the coding manual, there are editorial guidelines set by the NCDMF for documents, reports and publications.

Database additions and corrections are not possible without well-defined authority to advise data handling operations. Frequent interactions with biologists and technicians for training, coding help, additions to reference materials or any other assistance will be handled. Documentation of the biological database will be updated to reflect all active research programs providing input. Acceptance and approving new program documentation, maintaining existing documentation including the database coding manual and the data management operations manual that form the authority for control of the database will be principal in ensuring the high quality now established in the database.

BUG has conducted a series of meetings to identify deficiencies and determine actions to mitigate risks or improve the overall operation of Biological Database processes and procedures. Program documentation will be improved and simplified to benefit multiple users and assist staff in maintaining the documentation. This task will involve streamlining the review and acceptance process to facilitate the documentation change management process and reduce turnaround time.

Geographic reference materials including requirements documents and training materials will be updated to reflect the additional and updated GIS coverages and the new metadata information.

Project Summary:

Data Management was responsible for storing and maintaining individual biological program documentation in a central location for Division use. Documentation to assist database users and to describe Data Management operations was also updated and maintained. Table 6 summarizes the number of documentation tasks completed by segment. Tasks involved were highly variable and periodic varying from minor updates to documents for entirely new programs.

Table 6. Biological Program Documentation Tasks Completed by Segment.

F-75 Segment	FY	TOTAL
Segment 6	2006-07	217
Segment 7	2007-08	157
Segment 8	2008-09	181
Segment 9	2009-10	132
Segment 10	2010-11	164
TOTAL Segments 6-10		851

In the series of meetings conducted by BUG (noted in Job 1) to mitigate risks or improve the overall operation of Biological Database processes and procedures, several issues were noted pertaining to Job 4. Suggestions were identified where program documentation could be improved and simplified to benefit multiple users and assist staff in maintaining the documentation. Suggested changes to improve the workflow process are still under consideration and evaluation before implementing.

During all segments, metadata was reviewed for all geospatial program data and updated as needed.